Southern Forest Health
Research and Management Update

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IN THIS ISSUE

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Southern Research Station
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Contact: Bud Mayfield
828-257-4358
amayfield02@fs.fed.us

AND

USDA Forest Service
Forest Health Protection, Southern Region
Contact: Don Duerr
404-347-3541
dduerr@fs.fed.us

Science and Program Highlights

Laurel wilt disease likely due to a single introduction of the pathogen

It has been assumed that laurel wilt, a disease that has caused widespread mortality of redbay and other members of the Lauraceae in the southeastern U.S., was due to a single introduction of the pathogen, *Raffaelea lauricola*. A recent study by **Caroline Wuest** and **Thomas Harrington** (Iowa State University), **Stephen Fraedrich** (SRS 4552) and other scientists in Asia provides new evidence to support this hypothesis. The scientists investigated the genetic variation in *R. lauricola* populations in the U.S. and in Southeast Asia. In contrast to the Asian populations, populations of *R. lauricola* in the U.S. were for the most part genetically uniform, and only a single mating type was present. Results suggest it is critically important not to introduce additional isolates of *R. lauricola* into the U.S. as this could introduce the opposite mating type (found frequently in Asia) which could allow for genetic recombination. The study is slated for publication in the March 2017 issue of Plant Disease. For more information, please contact Thomas Harrington (tcharrin@iastate.edu) or Stephen Fraedrich (sfraedrich@fs.fed.us).

Iowa State Univ. student Caroline Wuest investigated the genetic diversity of the laurel wilt pathogen.

More sunlight: a friend in the fight against hemlock woolly adelgid

A recent study by SRS scientists and collobrators provides evidence that elevated sunlight levels benefit young hemlock seedlings infested with the hemlock woolly adelgid. Published in Forest Ecology and Management (www.srs.fs.usda.gov/pubs/53435), the study by **Steven Brantley** (Joseph W. Jones Ecol. Res. Center), **Bud Mayfield** (SRS 4552), **Robert Jetton** (NC State/Camcore), **Chelcy Miniat** (SRS 4353) and others used shade cloth to create varying levels of sunlight on potted eastern hemlock seedlings. Seedlings under heavy shade sustained high densities of the pest insect, but higher levels of sunlight resulted in lower adelgid densities, better plant carbon balance, and better shoot growth. The results suggest that forest management practices, such as

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Dr. Robert Jetton of NC State/Camcore infests hemlock seedlings with adelgids.

Sunlight and hemlock woolly adelgid (continued)

thinning or creating small canopy gaps, could play a role in the effort to manage and conserve populations of eastern hemlock, which have been devastated in the southern Appalachian Mountains. For more information please contact Bud Mayfield at amayfield02@fs.fed.us.

Ips beetle outbreak on the Oconee Ranger District in Georgia

Pine mortality associated with Ips avulsus beetles on the Oconee NF.

Staff on the Oconee National Forest in the Georgia piedmont began noticing signs of bark beetle activity late in the summer of 2016. By fall, the activity exploded and two aerial flights conducted in November 2016 detected over 325 beetle spots. Entomologist **Paul Merten** (FHP, Asheville NC) determined that the cause of the pine mortality was the four-spined *Ips* engraver beetle, *Ips avulsus*. In normal conditions, this seemingly innocuous tiny beetle barely causes any tree health issues other than killing a branch or two high in the tree crown of yellow pines. The exceptional drought conditions experienced throughout the Southeast last year enabled the explosive outbreak. *Ips avulsus* thrives in hot dry conditions and can complete a lifecycle in as little as 15 days when temperatures are optimal, leading to population spikes. Such optimal conditions were present on the forest, resulting in numerous spots larger than 10 acres each and one exceeding 50 acres. Damage of this magnitude is typically only seen with the other more well-known pine bark beetles, such as the southern pine beetle *Dendroctonus frontalis*.

Ips avulsus continues to create problems for resource managers on the Oconee National Forest. Widespread beetle damage in the Georgia piedmont region has led to an oversupply in the pine timber market making removal of infested trees difficult. The only economically feasible suppression technique for the *Ips* beetle is removal of infested trees. Another issue is deciding how to conduct the annual understory burning regime. Understory burning can have an additive impact on the beetle populations if the fire adds to tree stress. The Oconee is a red cockaded woodpecker (RCW) recovery area and understory burning is essential for RCW habitat. It is hoped that cool understory dormant season burns conducted in non-beetle infested stands will enable the forest to meet objectives. With precipitation rates of up to 15 inches from 13 Nov 2016 – 23 Jan 2017, tree vigor has improved, but time will tell if the outbreak will collapse by summer. For more information, contact Paul Merten at pmerten@fs.fed.us.

Carolina hemlock at Wisemans View overlooking Linville Gorge, NC

Update on the health assessment of Carolina hemlock populations

In the fall of 2015, Forest Health Protection, the Camcore Cooperative at NC State University, and the Southern Research Station began a project to assess all known Carolina hemlock populations across the species range. The primary objectives of this research are to map all reported Carolina hemlock populations, assess individual population levels of hemlock woolly adelgid and site health, and establish 10 long term monitoring plots on a subset of populations. Early on, a list of 138 Carolina sites was developed through conversations with numerous different parties familiar with the species. From this list, 68 sites have been visited, *(continued on page 3)*

Carolina hemlock health assessment (continued)

with 59 having been confirmed as containing naturally occurring Carolina hemlock. These visits include the southern-most reported population at Tallulah Gorge in northeastern Georgia, to the northern-most population along the Appalachian Trail outside of Natural Bridge, Virginia. Plans for 2017 include visiting the remaining 70 populations and assessing HWA levels and population health at all populations. Preliminary observations indicate that chemically treated trees and populations are faring better. It has also been noted that in sites with both eastern and Carolina hemlock the Carolina hemlocks are typically much healthier. For more information, please contact USFS affiliate Andy Whittier, wwhittier@fs.fed.us.

In The News

Dr. Michael Ulyshen receives White House recognition

Michael Ulyshen received the 2017 Presidential Early Career Award for Scientists and Engineers.

Research entomologist **Michael Ulyshen** (SRS 4552) is a recipient of **the Presidential Early Career Award for Scientists and Engineers (PECASE)**. The PECASE is the highest award for federal scientists and engineers in the early career stage and recognizes innovative research and commitment to community service. Ulyshen is the only U.S. Forest Service scientist and one of three U.S. Department of Agriculture employees to receive the honor.

"It is really exciting to receive this award but I want to stress that everything I have done has been in collaboration with other people," Ulyshen said. "I have been extremely lucky to work with so many great researchers over the years." Ulyshen began his Forest Service career in 2010. In that short time he has authored or coauthored more than 34-peer-reviewed publications along with three book chapters. His work has also been recognized both nationally and internationally. "Currently I am involved in projects on pollinators, wood-boring beetles, decomposition and forest health issues. Understanding how forest management decisions affect pollinators is a new research direction for me but I am hoping to make this a larger focus of what I do in the future," he said.

Staff Changes

Cera Jones joins SRS 4552 in Athens, GA

Cera Jones is the new contracted switchboard operator/receptionist located at SRS-Athens, GA. Some of her responsibilities include welcoming/directing visitors, receiving packages, metering mail, scheduling the conference room, and assisting with other clerical work such as data entry. Cera has a master's degree in entomology which she received from the University of Georgia under James Hanula and Kris Braman. Welcome, Cera!

Kenny Frick joins FHP in Asheville, NC

Forest Health Protection is pleased to announce that **Kenny Frick** has accepted a position as a Biological Science Technician in the Asheville field office. Kenny came on board with FHP in November after spending the past 10 years working with SRS in the Upland Hardwood Ecology and Management Unit (SRS 4157). Kenny brings a wealth of knowledge and experience to FHP and we are grateful to have him. Welcome and congratulations, Kenny!

Renea Francois joins FHP in Pineville, LA

The FHP-Alexandria Field Office in Pineville, LA would like to introduce the newest member of its team, Ms. **Renea Francois**. Renea accepted the position of Program Support Assistant and began on October 16, 2016. She is a native of central Louisiana and comes to us from the Kisatchie National Forest, where she served in various capacities for the last 25 years. She brings a wealth of experience to her new role and will be a valuable asset to the Region. Please join us in extending a warm welcome to Renea!

Technology Transfer

Publications (in print/press):

1. Aubrey, Doug P., S.W. Fraedrich, T.C. Harrington, and R. Olatinwo. **First record of *Cristulariella moricola* associated with foliar blight of Camden white gum (*Eucalyptus benthamii*), a bioenergy crop**. Biomass and Bioenergy (in press).
2. Brantley, S.T., A.E. Mayfield III, R.M. Jetton, C.F. Miniat, D.R. Zietlow, C. Brown, and J.R. Rhea. 2017. **Elevated light levels reduce hemlock woolly adelgid infestation and improve carbon balance of infested eastern hemlock seedlings**. Forest Ecology and Management 385: 150-160. doi: http://dx.doi.org/10.1016/j.foreco.2016.11.028.
3. Elkinton, J.S., Lombardo, J.A., Roehrig, A.D., McAvoy, T.J., Mayfield, A., and Whitmore, M. **Induction of cold-hardiness in an invasive herbivore: the case of the hemlock woolly adelgid (Hemiptera: Adelgidae).** Environmental Entomology (in press), doi: https://doi.org/10.1093/ee/nvw143.
4. Seibold, S., C. Bassier, P. Baldrian, L. Reinhard, S. Thorn, M. Ulyshen, I. Weiß, and J. Muller. 2016. **Dead-wood addition promotes non-saproxylic epigeal arthropods but effects are mediated by canopy openness.** Biological Conservation 204: 181–188. doi: http://dx.doi.org/10.1016/j.biocon.2016.09.031
5. Wiggins, G.J., J.F. Grant, J.R. Rhea, A.E. Mayfield, A. Hakeem, P.L. Lambdin, and A.L. Galloway. 2016. **Trapping methods to assess emergence, populations, and hybridization of *Laricobius nigrinus*, an introduced predator of hemlock woolly adelgid, in the Southern Appalachians.** Environmental Entomology 45: 1371-1378. doi: https://doi.org/10.1093/ee/nvw128.
6. Wuest, C. E., Harrington, T. C., Fraedrich, S. W., Yun, H.-Y., and Lu, S.-S. 2017. **Genetic variation in native populations of the laurel wilt pathogen, *Raffaelea lauricola*, in Taiwan and Japan and the introduced population in the United States.** Plant Disease (in press). doi: http://dx.doi.org/10.1094/PDIS-10-16-1517-RE

Submitted Publications (in review):

1. Audley, J., Klingeman, W., Mayfield, A., Myers, S., Taylor, A. ***Pityophthorus juglandis* (Coleoptera: Curculionidae: Scolytinae) colonization of *Juglans nigra* nursery trees.** Journal of Insect Science (in review).
2. Motley, K., N.P. Havill, A.L. Arsenault-Benoit, A.E. Mayfield, D.S. Ott, D.W. Ross, M.C. Whitmore & K.F. Wallin. In press. **Feeding by *Leucopis argenticollis* and *Leucopis piniperda* (Diptera: Chamaemyiidae) from the western USA on Adelges tsugae (Hemiptera: Adelgidae) in the eastern USA.** Bulletin of Entomological Research (in review).
3. Ulyshen, MD; Zachos, L., Stireman III, J.O., Sheehan, T.N., Garrick, R.C. **Insights into the ecology, genetics and distribution of *Lucanus elaphus* L., North America's giant stag beetle**. Insect Conservation and Diversity (in review).

Presentations and Lectures:

1. Cunard, C.E., R.D. Lucardi, K.S. Burgess, T.D. Marsico, J.N. Reed, L. Whitehurst, S.J. Worthy. 2016. **Preliminary results from the Federal Noxious Weed seed and floristic survey at the Port of Savannah**. Savannah Pest Risk Committee Meeting. US Customs and Border Protection, Department of Homeland Security, Operations Center. December 2016. Savannah, GA.

2. Mayfield, A.E. 2016. **Forest health update and discussion**. Southern Research Station-Kentucky-Tennessee State Line Meeting, Franklin, KY, 11 Oct 2016.
3. Ulyshen, M.D. 2016. **How important are insects to wood decomposition in southeastern U.S. forests?** South Carolina Entomological Society Annual Meeting, Hickory Knob State Park, Invited presentation, October 2016.
4. Ulyshen, M.D., Horn, S. 2017**. New wood in the woods: Patterns of wood decomposition in invaded forests**. USDA Interagency Research Forum on Invasive Species, Annapolis, MD, January 2017 (poster).

USDA Forest Service

Forest Health Protection, Southern Region:
http://www.fs.usda.gov/main/r8/forest-grasslandhealth

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RWU 4552: Insects, Diseases and Invasive Plants of Southern Forests:
http://www.srs.fs.usda.gov/idip/index.html